

Automatic Accident Detection and Rescue with Ambulance

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ABSTRACT : The rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities. Our project will provide an optimum solution to this drawback. According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal and sends it to Microcontroller. Microcontroller find the location coordinates of accident spot using GPS and sends the alert message including geographic allocation coordinates through the GSM Module to ambulance unit. So the rescue team in the ambulance can immediately trace the location by putting geographical location coordinates in Google earth application or any other Geographic location finder application. After conforming the location of accident spot the ambulance unit will starts its rescue operation. This system also controls the traffic signals in the path of ambulance and helps ambulance to reach hospital in minimum time.

Keywords- Ambulance, GPS, GSM, Microcontroller, Traffic control, Vibration Sensor

I. INTRODUCTION

The population of the world has been increasing, with China and India being the two most densely populated countries. Road traffic has also been getting more and more congested, as a higher population and increased business activities result in greater demand for cars and vehicles for transportation. This increased vehicle density leads to many road accidents. In road accident due to lack of emergency services people lose their lives. The main aim of this project is a scheme to detect accident, find accident location and provide a smooth flow for ambulance to reach hospital in time in emergency. [1]

In proposed system the unit installed in vehicle automatically informs accident to the pre-programmed numbers of rescue team of ambulance. In this system vibration sensor and GPS tracking system are used for accident detection. [2][3] When accident occurs, this system sends short message to rescue team in the

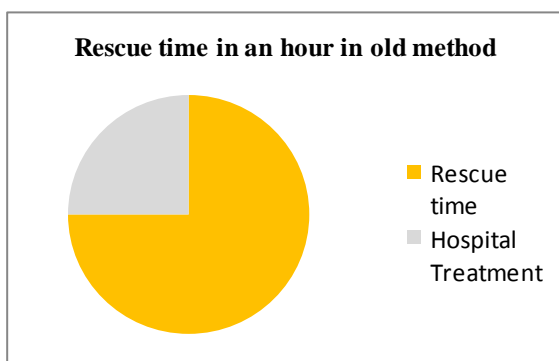
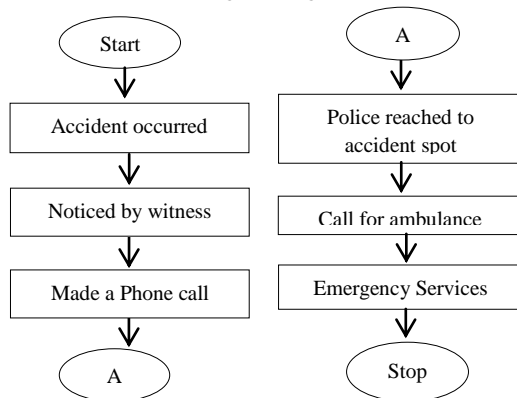
ambulance via GSM modem. Message will give longitude and latitude values. From these location coordinates accident can be determined. So the rescue team in the ambulance can immediately trace the location by putting geographical location coordinates in Google earth application or any other GPS viewer application. After conforming the location of accident spot the ambulance unit will starts its rescue operation. If the person meets with a small accident or if there is no serious threat to anyone's life, then the alert message can be terminated by the driver by a switch provided in order to avoid wasting the valuable time of the medical rescue team. [1][4] We have conducted a literature survey on different existing systems available to minimize the loss due to accidents. We found that many existing systems are not up to the mark to provide quick emergency help to the accident victims. At present criteria, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. [5][4]

II. COMPARISION OF OLD AND PROPOSED SYSTEM

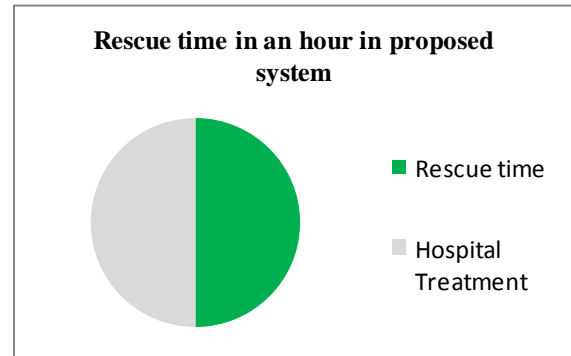
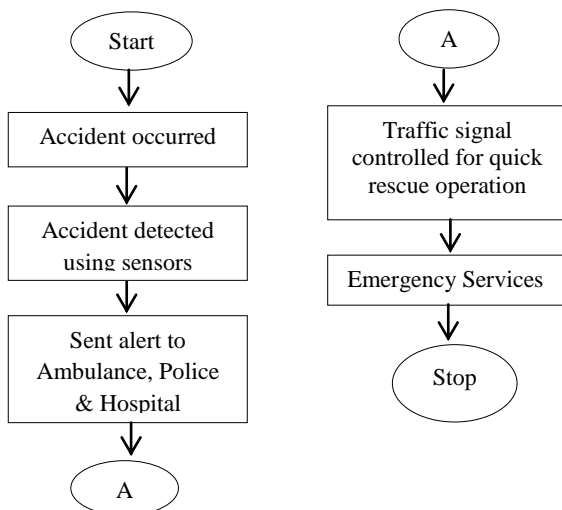
Golden hour in vehicle accident

Accident
Report
Alarm
Arrival
Initial access

We found following existing methods:



Proposed System:



III. TECHNIQUE OF IMPLEMENTATION

The proposed system consists of three main units, which coordinates with each other and makes sure that ambulance reaches the hospital without any time lag. Thus our system is divided into following three units:

1. The Vehicle Unit
2. The Ambulance Unit
3. The Traffic light unit

1. Vehicle Unit:

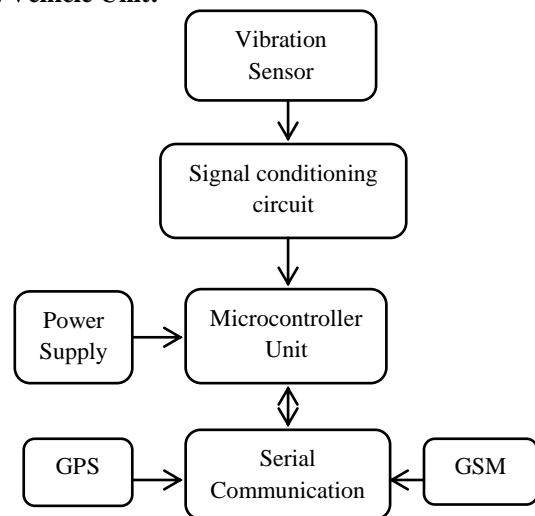


Fig. 1 Block diagram of Vehicle unit.

According to our system, every vehicle should have a vehicle unit. The vehicle unit consists of a vibration sensor, Microcontroller, a user interface, GPS system and a GSM module. There is need to process the low level voltage signal properly given by vibration sensor.

Vibration sensor can be designed as follow:

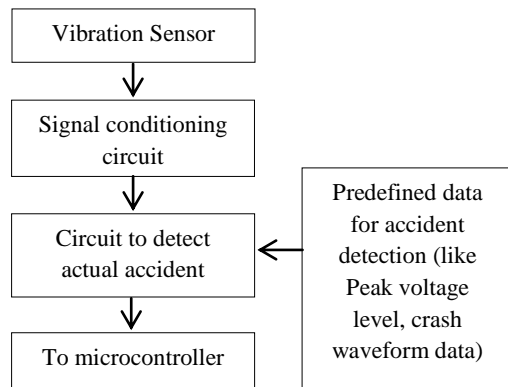


Fig. 2 Design of vibration sensor.

We can use multiple sensors for detection of accident to avoid any error in detection. These sensors can be installed in vehicle body at most vibration sensitive locations. A central system can be implemented inside vehicle to process the signal coming from sensors and to detect the accident from the signals coming from multiple sensors.

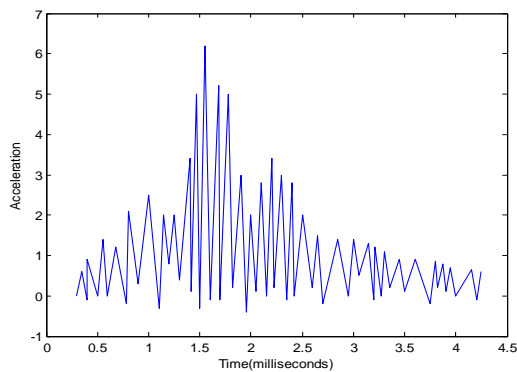


Fig. 2 Design of vibration sensor.

The predefined data i.e. Peak voltage level or crash waveform data are used to decide whether an accident is occurred or not. [4][6].The vibration sensor used in the vehicle will continuously sense for any large scale vibration in the vehicle. The sensed data is given to the controller GPS SYSTEM inside the vehicle. The GPS SYSTEM finds out the current position of the vehicle (latitude and the longitude) which is the location of the accident spot and gives that data to the GSM MODULE. The GSM MODULE sends this data to the control unit whose GSM number is already there in the module as an emergency number. [1] We can also use this vehicle unit for health monitoring of the patient using different sensors. [7]

2. Ambulance Unit:

The message send by vehicle unit is received by ambulance unit. The rescue team in the ambulance

immediately traces the location by putting geographical location coordinates in GPS viewer application. [1][4]

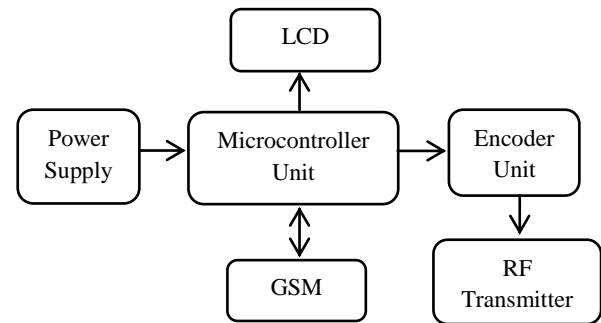


Fig. 3 Block diagram of Ambulance unit

After conforming the location of accident spot the ambulance unit will starts its rescue operation. At the same time, the ambulance unit turns ON the RF transmitter. This will lead to communicate with the traffic section.

3. Traffic signal unit:

Whenever traffic signal section receives the information about accident, the RF receiver in this Section is turned ON to search for ambulance near the traffic signal. Whenever the ambulance reaches near to the traffic signal (approximately 100m), the traffic signal will be made to green through RF communication. [2][3]

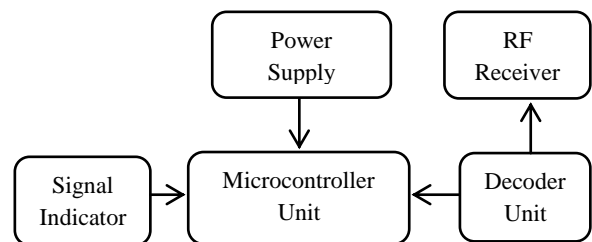
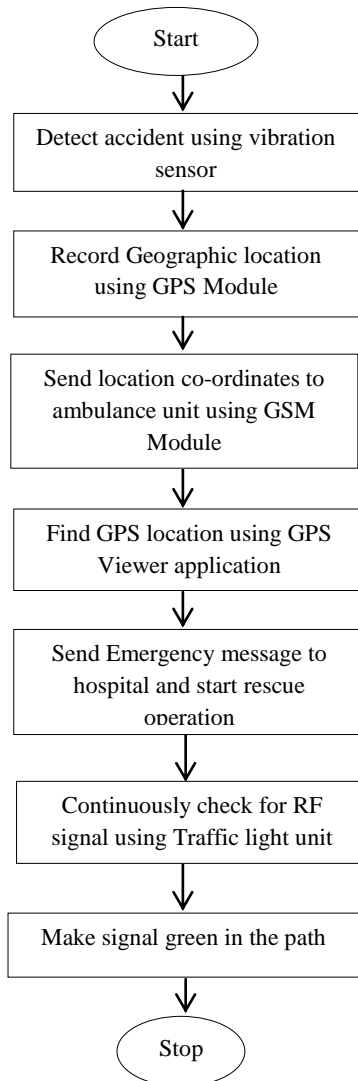


Fig. 4 Block diagram of Traffic light unit.

IV. METHODOLOGY (FLOWCHART)



Automatic accident detection using sensors, location tracking using GPS, sending location co-ordinates to ambulance, finding exact spot of accident using GPS viewer application, starting of rescue operation and traffic signal monitoring using RF transmitter and receiver all these steps are executed according to response of the circuit.

V. SIMULATION RESULTS

‘Automatic accident detection and rescue with ambulance’ is simulated using PROTEUS SOFTWARE and their results are presented here. The circuit model of the above system is shown and sensors are connected to measure output result.

A. ACCIDENT CONDITION:

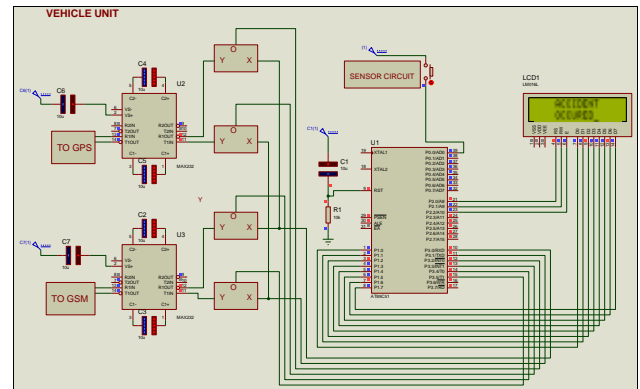


Fig 5: Simulation of Vehicle unit

The vibration sensor used in the vehicle will continuously sense for any large scale vibration in the vehicle. The sensed data is used to decide accident. We simulated some part of the vehicle unit to get the actual idea of implementation of the system.

B. AMBULANCE CONDITION:

When Ambulance unit gets the GPS co-ordinates using GSM module, it is displayed on LCD using microcontroller.

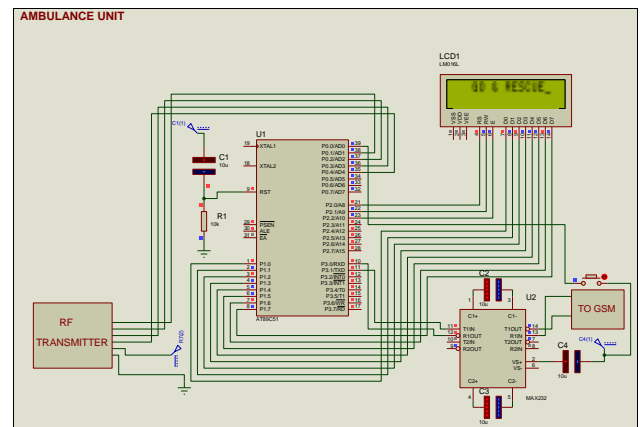


Fig 6: Simulation of Ambulance unit.

C. TRAFFIC LIGHT CONDITION:

After receiving the RF signal, the Traffic signal light is controlled using Microcontroller. The Traffic signals in the path of the ambulance made green.

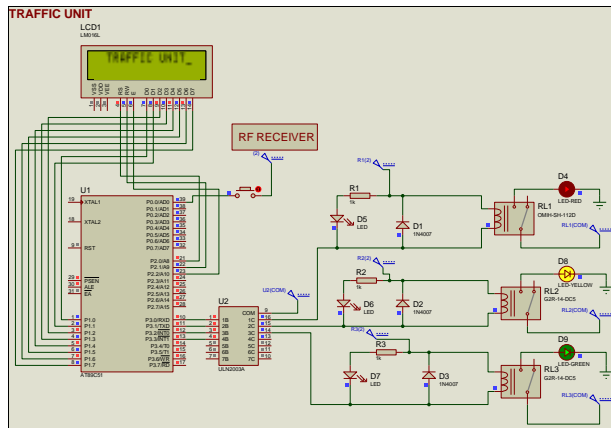


Fig 7: Simulation of Traffic light unit having full traffic signal management system.

VI. RESULTS

We first tried to understand the working of our project through the schematic and then we proceeded to build the circuit as per the schematic. We did the real time execution of complete project. Results of all three project units are observed. The overall developed circuit looks as shown in the following figure:

1. Vehicle Unit:



Fig 8: Vehicle unit with GPS and GSM

2. Ambulance Unit:



Fig 9: Ambulance unit showing received GPS co-ordinates

3. Traffic light Unit:



Fig 10: Traffic signals managed with RF Transmitter and receiver

VII. CONCLUSION

In this paper, a novel idea is proposed for accident detection and alert system with SMS to the user defined mobile numbers. The GPS tracking and GSM alert based algorithm is designed and implemented in embedded system domain. This system can be proved to be effectual to control not only ambulance but also authoritative vehicles. Thus, if this system is implemented in countries with large population like INDIA can produce better results. This system is more accurate with no loss of time. But there may be a delay caused because of GSM messages since it is a queue based technique, which can be reduced by giving more priority to the messages communicated through the controller.

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